



MICROSYSTEMS

Here Comes the PET

If Chuck Peddle can solve the parts, production, and distribution problems attendant to the manufacture and distribution of a new consumer product, you should soon be able to buy a complete computer system (CRT display, keyboard, 4K RAM memory, 12K ROM including Basic and a monitor, and cassette tape) for under \$600. And your purchase could just as easily be at your local department store or discount house as at your local computer store.

This machine is the Commodore PET, one of the first and perhaps the most complete of the consumer electronics personal/home computers beginning to appear. A few hundred have already been shipped. Projected volumes in the next few months, if met, stagger the imagination.

Already this product has begun to have a substantial impact, at least in the financial community. Commodore stock has gone from \$4 to \$17 per share, a rise so rapid that it has caught the watchful eye of the regulatory agencies. Trading was temporarily halted on both the American and Montreal stock exchanges last month following a Quebec Securities Commission announcement of an investigation into the recent increase in share price. The PET and its potential as a product may be the reason. Certainly it appears to be one of the most appealing packages in terms of cost and performance which has yet appeared.

Chuck Peddle is project manager for the PET. Before this he was involved with the design of the MOS Technology 650X and the Motorola 6800. Talking with him is a bit like talking with an evangelist: he exudes total confidence in his product, and he seems absolutely confident of its ultimate significance in the greater scheme of human events.

And yet one wonders. Certainly the Commodore plan seems uncommonly well thought out. The choice of the IEEE-488 bus makes the machine widely useful in industry. The problem of software is partially solved by making Basic built-in. The need for applications-oriented program libraries is satisfied by appealing to the avarice of programmers—a lucrative royalty is paid to authors of software. Software distribution is modeled on that of Top-40 popular music. It is a high-markup, fast-profit business. One can almost hear the pop-programming reviewers and their list of the top programs of the week.

But there remains the serious question of whether there is really a market for these machines, whether there is a need for small computers on the same scale as televisions, telephones, and stereos. Most importantly, *what are people going to do with these machines once they own them?*

Chuck Peddle is a man with a vision. He sees the PET as more than a product. In the interview below we talked about some of the problems of bringing a product like this to market.

COMPUTER: *To begin with, could you describe the PET?*

Peddle: We've tried to make a product that a normal retailer can merchandise to the ultimate consumer. To conserve retail shelf space we made it as compact as possible. And because the ultimate consumer wants a unit which does something immediately after being plugged in, we've incorporated such features as a built-in CRT, a built-in cassette, and built-in ROM Basic. In order for an inexperienced retail clerk to make a sale to an inexperienced customer, the unit has to have immediately perceived value. In other words we've approached the problem assuming that the greatest sales difficulty is that the item is a computer. People have been taught that computers are difficult to operate, things to be afraid of. So, we packaged the unit to seem warm and friendly: in fact we chose the name "Personal Electronic Transactor" as much for the acronym it would produce as for its descriptive accuracy. At the same time we've tried to project its value as a useful product.

COMPUTER: *It also presupposes some mass-media advertising.*

Peddle: Absolutely. Most of the computer professionals we talked to at NCC had never considered personal computing. The average American has no concept that personal computing is here. Thus, the PET has to be mass-advertised and mass-merchandised. We expect to spend a

significant amount of money on advertising to convince people that this is a legitimate product, not a specialty item.

COMPUTER: Does that mean you're going to go into retail marketing directly?

Peddle: Yes. We'll be dealing not only with specialty computer stores, but with one or two nationwide retailers. You could compare our product to a stereo, which is available both at discount and at specialty stores. The customer might do better cost-wise at a discount store, but at the specialty store he will get professional advice and service. The personal computer will be similarly merchandised.

COMPUTER: Do you see this becoming a widely used appliance?

Peddle: That's our goal. We're doing everything we can to make it happen. Our technical and marketing direction is to make the PET a consumer item. A secondary market emphasis will be on small business applications, where higher markups prevail. In that market the dealer can effectively sell a \$2000 system to a small businessman, then sell a \$500 system to the same individual to use in his home later.

COMPUTER: How will the price be set?

Peddle: It will vary among distributors. However, the large retailers will tend to set some price standards, no doubt.

COMPUTER: What sort of a discount is it necessary to offer a large retailer?

Peddle: We're trying to make sure that all retailers get legitimate discounts—which are always a subject of negotiation by the way. However, we'll be carrying the advertising load to begin with, so retailers should generally expect less discount than they might encounter otherwise.

COMPUTER: But won't you have to give a better discount than the traditional hobby computer store discount of 20-25%?

Peddle: Let's just say we're trying to make sure the retailer makes a profit all the time. Some items are taken out at lesser discounts and some of the add-on items get taken out at greater discounts, which is usual in most areas. Remember, you're not selling a product here; you're selling the beginning of a sales opportunity. After all, in the computer business the greatest profit is not the main item, it's in the add-on software and hardware. In the long run, software will have significantly greater discounts because the manufacturing costs are less.



Chuck Peddle (left), project manager for Commodore's PET, shares his conception of the system's marketing possibilities—and problems—with Dennis R. Allison, Microsystems editor.

COMPUTER: What about service?

Peddle: We've put a great amount of attention into making the PET easily serviceable. Every retailer who handles our product must be able to service it.

COMPUTER: Who is going to train service personnel?

Peddle: Us to begin with—later on, the retailers. That's why we're limiting retailers. The specialty store has to show us that he has technical capabilities before he gets to be a dealer.

COMPUTER: Will service contracts be available?

Peddle: Not from us, but they will definitely be available.

COMPUTER: Do you envision competition among service contractors?

Peddle: We have set up the unit so that it can be serviced by the individual repairman, so that's likely.

COMPUTER: What about software repair?

Peddle: If you mean operating systems software, you buy what you buy. There will be no warranty. We've done some fairly extensive testing to see that the software is acceptable.

COMPUTER: Who wrote the Basic?

Peddle: Rick Wylton at Microsoft. This is the fourth generation of that Basic.

We climbed on the back of all the MITS users who had problems and on all of the 6800 users.

COMPUTER: What sort of test procedures did you go through?

Peddle: We ran an extensive set of benchmarks and tried to break it using standard software-breaking techniques. Also, we tried to get people at NCC to crash it, and we've tried to crash it ourselves. So far it's held up.

COMPUTER: How do you feel about going to outside people for software?

Peddle: For specific languages I will continue to go outside. I like to get languages that have run successfully elsewhere, but for real advances in other areas, we always tend to stay in-house.

COMPUTER: How is Commodore financing the PET?

Peddle: Through our own capital resources, which has been our traditional practice. Much of the basic cost is internal. And we have facilities all ready to go into production. We're making the semiconductors right now, and we're geared for the PC boards. The incremental cost of processing additional wafers is really just the cost of silicon and some small power consumption. It's strictly a matter of adding the people and sustaining the outside cash flow. Because we are a vertically integrated company, our costs are not the same as if we were

starting a manufacturing facility. Furthermore, we can generate capital based on our successful earnings record if we need to.

COMPUTER: Will Commodore break even on this venture from the beginning?

Peddle: Yes. We'll be at breakeven from the start. We only recently tooled the plastic housing. We have a facility in Toronto that makes metal cabinets. That's where we'll build the first 3000 units. When the product is selling and we have some cash in the bank, we can afford to tool up without having made any real investment at all.

COMPUTER: Will the PET impact the traditional computer manufacturers substantially? Will they have to compete with you directly?

Peddle: For a while they'll be careful not to. DEC is working very hard to get vertically integrated. When they achieve that, then potentially DEC would be a very strong competitor. If they concentrate on DEC quality and packaging systems that can legitimately be sold inexpensively, they'll discover we've actually opened a brand new sales channel for them. One of the reasons computers cost more is because theoretically you have to have computer salesmen and a computer sales office. The specialty retailer doesn't care about such things. He may not have much inventory, but he will carry any product he can sell and make a profit on.

COMPUTER: That's exactly why computer stores want to handle the PET.

Peddle: Absolutely. We are creating a whole new distribution channel for both software and hardware. It's going to bring a lot of people in. And they are going to come back, wanting not only peripherals, but wanting to expand to the next level up.

COMPUTER: Who will be your major competitors?

Peddle: I think if you were to cut the world up into pieces a year from now, the big guns would be a major Japanese company, Tandy-Radio Shack, TI, Atari, a European company, and Commodore.

COMPUTER: Will price erosion occur here as in the calculator market?

Peddle: I hope not. One of the things that killed the calculator was that suddenly everybody could make calculators cheaply because the semiconductors' price was dropping so dramatically. The manufacturer had paid a price for the chips when he put

the thing together, and then because of volume, the price was suddenly decreased. He still paid for his semiconductors at the old price, yet now people were selling the product based on the new price. The retailer's loss was passed on to the manufacturer where possible. A definite lesson had to be learned in the calculator and watch businesses.

In short, the PET was set at a price that we hope will hold reasonable for us and for our customer.

By the way, calculators are finally coming back. The LCD pocket calculator is going for more money because of its distinct features and high quality. In the watch market, people are beginning to buy quality again. That's what I'd like to see happen with inexpensive computers, with an emphasis on peripherals.

COMPUTER: Do you see a fixed entry cost for personal computers in the \$500-\$1000 range?

Peddle: Price erosion is acceptable to whatever level makes it a mass product. But this machine deserves to be extended, not cost-reduced. At some point when the market settles down and chooses the price, you won't see further reductions. Rather, you'll get enhanced features.

COMPUTER: Are you doing your manufacturing in the U.S., or are you building some pieces offshore and doing assembly here?

Peddle: The only place to buy cassettes is out of Hong Kong and Korea. Nobody makes black and white TV tubes in the U.S. anymore; you have to get them from Taiwan. The keyboards are Japanese because they tend to do a good job in that area. The semiconductors are, of course, made here. The housings, PC work, and assembly will all be done in the U.S. for our market, and in Europe and in Japan for those markets.

COMPUTER: What sort of volumes do you expect to attain by Christmas?

Peddle: 5000 a month in the U.S. We have told several potential OEM suppliers that we'll be able to handle any quantity up to 30,000 a month by the second quarter of next year.

COMPUTER: Will you make simultaneous sales thrusts in Europe?

Peddle: We had positive response from the Hannover Fair. We'll probably be back there in Munich and start selling in Europe after the first of the year. Remember, we have assembly plants in both England and France.



"People have been taught that computers are difficult to operate, things to be afraid of. So, we packaged the unit to seem warm and friendly: in fact we chose the name 'Personal Electronic Transactor' as much for the acronym it would produce as for its descriptive accuracy."

COMPUTER: Will you stick with Basic as your primary language?

Peddle: Yes. We did some things to Basic in the I/O area to make it a lot more flexible for growth. Thus, the first-time user can walk up to the machine and operate it at a comfortable level. But then we did the I/O structure for the sophisticated programmer. It took a great deal of discipline not to build in any limitations for future extensions in peripherals and peripheral software.

COMPUTER: Then PET is basically a peripheral independent language processor.

Peddle: Absolutely, though there is a tendency to violate that rule almost immediately. We've tried not to. We have a logical file structure operating system that not only lets you operate at the logical file level, but lets you get in and play with that IEEE bus, down to almost anything you want to do on it. By the way, we do not allow



in the language for bit-fiddling as such on the bus and on the peripherals. You have to get out of the language to operate the PIA pins. I want the business systems analyst who wants

to write a good program using our floppy and our printer to feel comfortable sitting down and doing it without feeling inhibited by the language. If I have done that, I have met my goal.

COMPUTER: Will you come out with any materials supporting the machine language on the 6502?

Peddle: We'll have an assembly language. There is a monitor which is currently not in the software. It will be available on tape.

COMPUTER: What about text editing?

Peddle: We have a string editor which has editing capability already in it. The question is whether that's a legitimate text editor or not. More work needs to be done.

COMPUTER: What software projects are currently in the works?

Peddle: A whole series of software projects have been started outside because of our official non-recognition. We offer an internal service to indicate what projects are being developed elsewhere. We have written the first instruction manual aimed more at the consumer than at teaching people how to use the machine. We will make a tutor tape to teach how to program.

COMPUTER: Can you give any price estimates on the educational packages?

Peddle: The first year out, we'll be able to get \$20 for a decently packaged product. After that, I think the high volume stuff is going to have to drop to the \$10 range.

COMPUTER: What are the ranges on royalties?

Peddle: We'll try to make the successful author a good financial deal. It's going to be a function of the market for the particular product. To handle this software publishing, we will set up either a division of the company or a separate company.

We will sell on a royalty basis only software which has been installed and tested in a financially rewarding environment. Software that sells is what we are buying right now, in the interest of our retailer, the guy who is really making sales. Why should he take his product to the community unless it is making him money?

COMPUTER: What software do you have in progress: cassette tape-oriented stuff?

Peddle: Right. Nothing that we are writing will require any peripherals other than what you can buy with your basic package. Of course, as soon as we get a printer there will be a set of printer-supported programs that will only run the printer.

COMPUTER: Will the printer be capable of handling PET graphics?

Peddle: Its print head is seven rather than eight dots. We'll do the graphics to the extent that we can.

COMPUTER: What about floppies?

Peddle: We're negotiating with two companies on mini-floppies right now. It turns out that the current supply of mini-floppies in the world is tight.

COMPUTER: Is there anyone that is making IEEE bus peripherals that are price-compatible with the PET?

Peddle: None that are price-compatible, but I think we may see similar private label products being sold, maybe even with the same form factors. Don't be surprised to see companies like Tektronix and HP working with PET. HP might not be pleased with this outcome, since they apparently own the IEEE bus controller market.

COMPUTER: But the IEEE bus controller market is going to be strongly impacted by the fact that almost everyone in the semiconductor business



"I want the business systems analyst who wants to write a good program using our floppy and our printer to feel comfortable sitting down and doing it without feeling inhibited by the language. If I have done that, I have met my goal."

is going to be producing an IEEE bus chip. Why did you choose the IEEE 488 bus?

Peddle: Because I believe in what the IEEE bus is trying to accomplish. This is a utility product, the beginning of an era. You need standardization. My electrical plug has got to plug into all electrical outlets. For the 488, a lot of time and effort were put into trying to define something that was a plug-compatible standard. By using it in the PET, a large number of interesting commercial peripherals are immediately available, such as digital voltmeters and typewriters.

COMPUTER: *One has the impression that a color bit map display is low on the list of priorities, compared to the mini-floppy and the printer.*

Peddle: Yes. I have defined the work to include things necessary to make the small business thing work, and to give people traditional computing capability. In addition to that, there

will be something that is for fun. But that's still a secret.

COMPUTER: *What's involved in adding more memory to the PET?*

Peddle: If you want to expand in the traditional manner, there is a box for memory expansion, brought out on the side. As soon as I put another box out there, I can do almost anything with that box I want to.

COMPUTER: *Presumably, in a lot of the boxes you are going to have another processor.*

Peddle: All the boxes will have at least one other processor in them. But the board costs and power supply costs dominate; the cost for parts is not the important issue.

COMPUTER: *And there is a facility for adding new native languages?*

Peddle: Every computer resource that is not tied up inside is available on that connector.

COMPUTER: *How do you add and replace ROMs?*

Peddle: Since ROMs are fairly new components, they will be on sockets until we're satisfied with the code. After that, it will require unsoldering; you don't want to do that. That's why we brought the bus out. Do your outboard stuff outboard. This is not a unit to be tinkered with. You'd blow

the diagnostics the minute you did that. The PET has built-in self-diagnosis.

COMPUTER: *One thing that might keep some people from buying the PET is the lack of a typewriter keyboard.*

Peddle: The market will obviously determine that. But we are, in fact, planning to include one on higher-priced products. PET II will have a dual cassette built in and a full-sized keyboard. It will be aimed at the small business market and will be priced accordingly.

COMPUTER: *What are you doing about the education market?*

Peddle: We're already making some machines available for use in school programs, and we've set up special education programs for those planning fall courses. If professional educators and programmers start using this medium to develop material, we'll mass merchandise it directly to the ultimate consumer, which is not a chain that the average teacher has available to him. But frankly the aspect of education I consider the most important, far broader than the teaching of children, is adult education. That's a fine market that everyone is missing—and we don't intend to neglect it. That's where the PET can be truly revolutionary. ■